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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/604,794	08/18/2003	William Tze-You Chen	9725-US-PA	1793

31561 7590 05/28/2004

JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE

7 FLOOR-1, NO. 100

ROOSEVELT ROAD, SECTION 2

TAIPEI, 100

TAIWAN

EXAMINER

WILLIAMS, ALEXANDER O

ART UNIT

PAPER NUMBER

2826

DATE MAILED: 05/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/604,794

Applicant(s)

CHEN ET AL

Examiner

Alexander O Williams

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 18 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

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Serial Number: 10/604794 Attorney's Docket #: 9725-US-PA  
Filing Date: 8/18/2003; claimed foreign priority to 9/10/2002

Applicant: Chen et al.

Examiner: Alexander Williams

Applicant's Response filed 3/18/04 has been acknowledged.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Initially, and with respect to claims 5 to 7, 12 to 14, 19, 24 and 25, note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); In re Fitzgerald, 205 USPQ 594, 596 (CCPA); In re Marosi et al., 218 USPQ 289 (CAFC); and most recently, In re Thorpe et al., 227 USPQ 964 (CAFC, 1985) all of which make it clear that it is the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that Applicant has burden of proof in such cases as the above case law makes clear.

As to claims 1, 3, 4, 8, 10, 11, 22 and 23, note that the specification contains no disclosure of either the critical nature of the claimed dimensions or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Claims 1 to 25 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Applicant's Prior Art (figure 1) in view of Chow et al. (U.S. Patent # 2002/0185733 A1).

In claim 1 and similar flip chip structure claim 8, Applicant's Prior Art (figure 1) show an under-ball-metallurgy layer **142**, comprising: an adhesion layer **120**; a barrier layer **130** over the adhesion layer, wherein the barrier layer is fabricated using a nickel-vanadium alloy; and a wettable layer **140** over the barrier layer, but fail to explicitly show the wettable layer is fabricated using copper and has a thickness between about 3 to about 8 micron.

Chow et al. is cited for showing a barrier cap for under bump metal. Specifically, Chow et al. (figures 1a to 1j) specifically figure 1h discloses the wettable layer (layer between 14 and 8) is fabricated using copper and has a thickness between about 3 to about 8 micron (see paragraph [0015] for the purpose of preventing in-diffusion of the solder into the semiconductor chip).

2. The under-ball-metallurgy layer of claim 1, either reference show wherein material constituting the adhesion layer is selected from a group consisting of titanium, titanium-tungsten alloy, aluminum and chromium.
9. The flip-chip structure of claim 8, either reference show wherein material constituting the adhesion layer is selected from a group consisting of titanium, titanium-tungsten alloy, aluminum and chromium.
15. The flip-chip structure of claim 8, either reference show wherein material constituting the passivation layer includes an inorganic compound.
16. The flip-chip structure of claim 8, either reference show wherein material constituting the passivation layer includes high molecular weight polymer.
17. The flip-chip structure of claim 8, either reference show wherein material constituting the bump includes a lead-tin alloy.
18. The flip-chip structure of claim 8, either reference show wherein material constituting the bump includes a lead-free alloy.

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19. The flip-chip structure of claim 18, either reference show wherein material constituting the bump is selected from a group of metals consisting of tin, gold, silver, copper, bismuth, antimony, indium, zinc or various combinations of the metals.

20. Applicant's Prior Art (figure 1) show an under-ball-metallurgy layer **142**, at least comprising: an adhesion layer **120**; a barrier layer **130** over the adhesion layer; and a wettable layer **140** over the barrier layer, but fail to explicitly show wherein the wettable layer is fabricated using copper and has a thickness between about 3 to about 8pm.

21. The under-ball-metallurgy layer of claim 20, either reference show wherein material constituting the adhesion layer is selected from a group consisting of titanium, titanium-tungsten alloy, aluminum and chromium.

Therefore, it would have been obvious to one of ordinary skill in the art to use Chow et al.'s thick wettable layer to modify Applicant's Prior Art figure 1's wettable layer for the purpose of providing high speed and high density.

As to the grounds of rejection under section 103, see MPEP § 2113.

Initially, it is noted that the 35 U.S.C. § 103 rejection based on an adhesive layer and a barrier layer deals with an issue (i.e., the integration of multiple pieces into one piece or conversely, using multiple pieces in replacing a single piece) that has been previously decided by the courts.

In Howard v. Detroit Stove Works 150 U.S. 164 (1893), the Court held, "it involves no invention to cast in one piece an article which has formerly been cast in two pieces and put together...."

In In re Larson 144 USPQ 347 (CCPA 1965), the term "integral" did not define over a multi-piece structure secured as a single unit. More importantly, the court went further and stated, "we are inclined to agree with the solicitor that the use of a one-piece construction instead of the [multi-piece] structure disclosed in Tuttle et al. would be merely a matter of obvious engineering choice" (bracketed material added). The court cited In re Fridolph for support.

In re Fridolph 135 USPQ 319 (CCPA 1962) deals with submitted affidavits relating to this issue. The underlying issue in In re Fridolph was related to the end result of making a multi-piece structure into a one-piece structure. Generally, favorable patentable weight was accorded if the one-piece structure yielded results not expected from the modification of the two-piece structure into a single piece structure.

Claims 1 to 25 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Chow et al. (U.S. Patent # 2002/0185733 A1).

In claim 1 and similar flip chip structure claim 8, Chow et al. (figures 1a to 1j) specifically figure 1h show an under-ball-metallurgy layer, comprising: an adhesion layer **((bottom part of 8))**; a barrier layer **(upper part of 8)** over the adhesion layer, wherein the barrier layer is fabricated using a nickel-vanadium alloy; and a wettable layer 12 over the barrier layer, wherein the wettable layer is fabricated using copper and has a thickness between about 3 to about 8 micron (see paragraph [0015]) **(Note: Since layer 8 can be one or more of Ti, Ti/W, Ni/V and Cu, a first portion of 8 can be the adhesive layer and the second portion of 8 can be the barrier layer).**

2. The under-ball-metallurgy layer of claim 1, Chow et al. show wherein material constituting the adhesion layer is selected from a group consisting of titanium, titanium-tungsten alloy, aluminum and chromium.

9. The flip-chip structure of claim 8, Chow et al. show wherein material constituting the adhesion layer is selected from a group consisting of titanium, titanium-tungsten alloy, aluminum and chromium.

15. The flip-chip structure of claim 8, Chow et al. show wherein material constituting the passivation layer includes an inorganic compound.

16. The flip-chip structure of claim 8, Chow et al. show wherein material constituting the passivation layer includes high molecular weight polymer.

17. The flip-chip structure of claim 8, Chow et al. show wherein material constituting the bump includes a lead-tin alloy.

18. The flip-chip structure of claim 8, Chow et al. show wherein material constituting the bump includes a lead-free alloy.

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19. The flip-chip structure of claim 18, Chow et al. show wherein material constituting the bump is selected from a group of metals consisting of tin, gold, silver, copper, bismuth, antimony, indium, zinc or various combinations of the metals.

20. Chow et al. (figures 1a to 1j) specifically figure 1h show an under-ball-metallurgy layer, at least comprising: an adhesion layer (**bottom part of 8**); a barrier layer (**upper part of 8**) over the adhesion layer; and a wettable layer **12** over the barrier layer, but fail to explicitly show wherein the wettable layer is fabricated using copper and has a thickness between about 3 to about 8pm (see paragraph [0015]) (**Note: Since layer 8 can be one or more of Ti, Ti/W, Ni/V and Cu, a first portion of 8 can be the adhesive layer and the second portion of 8 can be the barrier layer**).

21. The under-ball-metallurgy layer of claim 20, Chow et al. show wherein material constituting the adhesion layer is selected from a group consisting of titanium, titanium-tungsten alloy, aluminum and chromium.

Therefore, it would have been obvious to one of ordinary skill in the art to use the adhesive layer and the barrier layer as "merely a matter of obvious engineering choice" as set forth in the above case law.

## Response

Applicant's arguments filed 3/18/04 have been fully considered, but are moot in view of the new grounds of rejections detailed above.

The references are cited as of interest to this application, but not applied at this time.

Field of Search	Date
U.S. Class and subclass: 257/738,737,777,762-768,779,778,784,786	12/12/03 5/24/04
Other Documentation: foreign patents and literature in 257/738,737,777,762-768,779,778,784,786	12/12/03 5/24/04
Electronic data base(s): U.S. Patents EAST	12/12/03 5/24/04

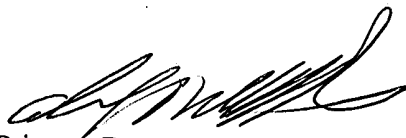
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander O Williams whose telephone number is (571) 272 1924. The examiner can normally be reached on M-F 6:30-7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272 1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AOW  
5/25/04



Primary Patent Examiner  
Alexander O. Williams